Diseases and Nematodes in Developing Vineyards

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With the high costs involved in the establishment of a new vineyard, one of the best investments is in healthy nursery stock or planting material. Unfortunately, with the recent rush to plant large areas to vines and the resultant shortage of planting material, many areas have been planted with inferior stock. In addition, many operators have taken short cuts in relation to standards of hygiene and the results of this are beginning to show up as dead or declining vines in some vineyards. Productivity will be reduced in these vineyards due to the loss of vines and a lack of vigour; some vines will never reach their full potential.

Some of the new areas recently planted to vines are isolated from other plantings and it should have been possible with the use of healthy planting material to establish vineyards where spraying for diseases such as powdery mildew, botrytis, downy mildew and phomopsis would not be required for some years. Unfortunately this has not happened and in many new plantings some of these diseases are showing up within the first two seasons. In some cases nematodes have also been spread by infested planting material, and highly susceptible, own-rooted vines have been planted in infested ground.

The following points need to be considered to maximise the potential of any vineyard.

Selection of cuttings

Cuttings should only be taken from well-matured canes from healthy vigorous vines that have been regularly inspected and marked for their apparent superiority during the growing season.

Taking cuttings from material collected from the ground after pruning should be avoided as it is often difficult to detect diseased material at this stage. Fungi causing powdery mildew, botrytis and phomopsis survive on infected canes and are the main source of infection in new vineyards. These diseases can be detected by examining vines during the growing season, at harvest and after leaf fall. Canes showing black, web-like staining on green or mature wood have been infected with the powdery mildew fungus and should be avoided, as the fungus survives in infected buds. Similarly canes with bleached white areas or those with longitudinal cracks should not be used as these are likely to be infected with botrytis or phomopsis.

Several virus diseases of grapevines are also transmitted in cuttings and to reduce the risk of introducing these problems only certified planting material from vine improvement schemes should be used. Strictly observe all quarantine restrictions on the import of propagation material: Australia is free of several important diseases of vines and, locally, some areas remain free of certain pests and diseases occurring elsewhere. Cleaning machinery of vine debris and soil before moving between vineyards is important for this reason.

Bacterial diseases such as crown gall can also be spread in infected cuttings and therefore only vines free from galling at the crown or at graft unions should be used for cuttings.

Preparation of cuttings

Some diseases such as crown gall may be spread during budding, grafting and the preparation of cuttings. To prevent this, pruning tools should be frequently dipped in a hypochlorite solution.

Bundles of cuttings can also be dipped in fungicides such as Chinosol® to control diseases such as botrytis and phomopsis. However for this treatment to be most effective, the label recommendations should be carefully followed in relation to the preparation of the cuttings, dipping concentration and dipping time.

Similarly, hot water treatment can be used to reduce the risk of transmission of some diseases and nematodes; dipping in diluted nematicide (e.g. Nemacur®) solutions can be effective against nematodes in rootlings. However, prevention of infection is preferable to use of such treatments as the treatments may be of little value where planting occurs in nematode-infested soil.

Root rotting fungi such as Fusarium, Pythium, Phytophthora and Rhizoctonia are common in nursery stock and are thought to be associated with decline and death of young vines. Exactly when the vines become infected with these fungi is unclear at this stage, but it may be that infection arises when bundles of cuttings are heeled in and held for long periods in infested soil.

Where cuttings need to be stored in the ground, the site should be carefully selected to avoid waterlogging. Ideally cuttings should be held in well drained sand or other soil-less mixtures that have been treated to eliminate root rotting fungi and nematodes.

Rooted cuttings infected with root rotting fungi struggle to become established vines and many die within the first year of planting. Replacing these is a costly exercise, so it is more efficient to prevent infection. Dipping the cuttings in fungicide or other treatments to eliminate root diseases or protect rooted cuttings from infection have not been evaluated. Treating infected vines once they have been planted is generally ineffective.

Disease control in young vines

Rapidly growing shoot growth on young vines is highly susceptible to diseases such as downy and powdery mildews, botrytis and phomopsis. Regular applications of protectant fungicides are warranted in young vines to ensure that only healthy wood is laid down during the establishment phase. Growth flushes towards the end of summer and in autumn should be checked for disease, and fungicides applied if needed. This is particularly so with fungi such as phomopsis that can infect young growth late in the season. If shoots infected with phomopsis are laid down and become part of the main framework of the vine, the infected tissue acts as a source of spores in future seasons.

Nematode control in young vines

Planting material should be carefully inspected for signs of nematode infection (and fungal diseases), including knotted or otherwise abnormal roots. The current shortage of planting material does not incline purchasers towards such selectivity, continued page 29
yet poor material may have a lasting influence on vineyard productivity. Make sure that the nursery has soil tested for nematodes regularly and find out what program, and its effectiveness, is used by the nursery to prevent a build-up of soil-borne pathogens.

Neglecting to test soil for nematodes before purchase of land or planting to vines has also resulted in vineyards being set-up in ground heavily infested with nematodes, risking poor establishment and reduced productivity. In many cases vines have been planted in ground previously used either for grapevines or for other horticultural crops (e.g. citrus, stone-fruit, vegetables) and field crops (e.g. lucerne, clovers), and infested with root-knot, citrus or other nematodes, such as leon and stubby root nematodes. We know very little about the resistance of vines to some of these nematodes, yet have been unable to take up the opportunity offered by such situations to learn more, due to declining research support in this area. Similarly, planting has occurred in ground likely to be heavily infested with soil-borne pathogens such as Fusarium, Verticillium, Phytophthora, Pythium and Rhizoctonia species, and other fungi. The effects of these pathogens on young vines growing in the enormous variety of soil types and climates occurring under Australian viticulture is not known. However, we have shown that some R. solani races commonly associated with vegetables can damage young vines.

Pre-planting treatments (e.g. extended fallowing or cropping to non-host cover crops; soil fumigation) and, especially, the use of grafted, nematode-resistant root stocks, are often more effective strategies against nematodes than annual application of chemicals to soil after planting. Use of chemicals, both fumigants and nematicides, is under threat because of environmental and health concerns. Biofumigant cover crops and antagonistic micro-organisms are being investigated for control of nematodes but are not yet in commercial use.

Use of resistant rootstocks is the most cost-effective option for control of nematodes (where other considerations permit their use, viz. soil type, vine vigour, grape yield/quality, however supply of grafted vines has not kept up with demand. This is a problem requiring attention given the plantings projected to occur into the next century under the national industry plan. Also, currently available stocks possess resistance to only a limited range of nematodes, mainly root-knot nematodes, and evolutionary development of these nematodes poses a threat to such resistance in the longer term.

Further research is needed to identify and develop sources of resistance, and to find simpler ways of utilising such resistance than by grafting rootstocks.

Conclusions

Planting material can introduce diseases and nematodes to vineyards. Leading both to direct losses in production and to higher operating costs. It is particularly important that healthy material be used in new districts and in ground not previously planted to grapevines. Use only certified material from vine improvement schemes and avoid material with obvious symptoms of disease. Test soil for nematodes before purchasing land or planting vines, and use nematode-resistant root stocks where appropriate. Clean machinery before moving between vineyards. Carefully monitor developing vineyards for disease and apply fungicides as needed to ensure strong, healthy growth.